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Consortium for Robotics and Unmanned Systems Education and Research (CRUSER)

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Monterey, California: Naval Postgraduate School

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# CRUSER • NEWS

Consortium for Robotics and Unmanned Systems Education and Research

FROM TECHNICAL TO ETHICAL  
FROM CONCEPT GENERATION TO EXPERIMENTATION



NAVAL  
POSTGRADUATE  
SCHOOL

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<http://CRUSER.nps.edu>

## New Autonomous Systems Laboratory Course Allows NPS Students to Explore Key Research Areas in Intelligent Robotics

by Vladimir Dobrokhodov, Mark Karpenko, Kevin Jones, Isaac Kaminer and I. Michael Ross

What you see today is a number of students of a newly developed Autonomous Systems Laboratory course at the MAE department “playing” with robotic rovers in specifically crafted team games.

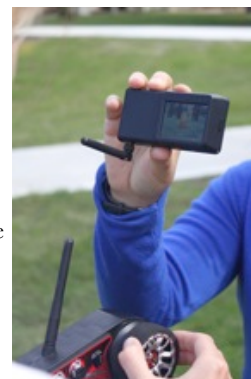
In today's first laboratory experiment, the students mimic the functionality of onboard sensors using their own visual perception of the environment and drive the rovers manually thus replicating system autonomy by human-in-the loop efforts. Exploring the challenges of autonomy by “playing” helps students understand the key building blocks necessary to perform these same tasks autonomously and develop a better appreciation for the value of the algorithms built into the robots. In subsequent laboratory experiments, the students will perform these same tasks by running the robots autonomously. They will face the ultimate truth – can robots do a better job?

It is envisioned by the course developers that by fostering experimental interaction with a friendly robotic platform (an RC car and an autopilot developed and integrated by researchers at NPS) a student can build more intuitive rather than theoretical understanding of key autonomous systems concepts necessary for the intelligent robotics. Thus, the Autonomous Systems Laboratory makes a first step in bridging the gap between the initial interest in a general field of robotics and the core theoretical courses in Autonomous Systems where students will thoroughly investigate autonomous operations, human-machine interaction, cognitive systems and many other key components in detail.

After receiving formal approval from the Academic Council, the course will be offered by the MAE department to all interested students at NPS. The aim of this course is to introduce current and future military officer students and defense engineers to a conceptual approach of overall design of unmanned intelligent systems including concepts of sensing, navigation and control, communication, payloads, multiple UxVs vehicle architectures, mission planning and operations that are relevant to ongoing and future asymmetric warfare. The hands-on experience offered by the course is intended to leap-frog the students' knowledge and understanding in diverse technical and operational areas in autonomous systems, with the ultimate objective of equipping future decision makers with a fundamental understanding of the key research directions in intelligent robotics.



Lt. Travis Bateman, Lt. j.g. Kerri Ackman, Cmdr. Jeffery King, Lt. Marta Savage and Research Assistant Wenschel Lan



## DIRECTOR'S CORNER

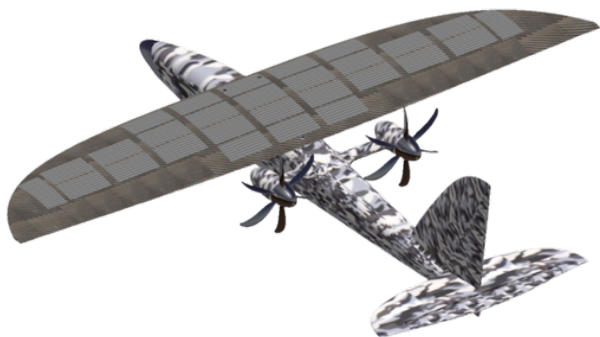
Many thanks to the CRUSER Col NPS students, Navy labs and industry engineers who participated in our September Warfare Innovation Workshop. Innovation played a key role in their development of over 40 new concepts for UxS deployment. Dan Dutrow, visiting engineer from JHU/APL summed it up best: *"Thank you for hosting this event and compiling this incredible volume of innovative ideas. I will be certain to share this with my colleagues in the field and our research & development leadership. Not only have you given me this great resource, a wonderful list of contacts, but you have also demonstrated to me how innovation is not just a fuzzy buzzword but something we can achieve through focused effort. I look forward to continued engagement with all of you and the CRUSER community. Let's make this the beginning of something great."* For a copy of the CRUSER Warfare Innovation Workshop 2011 After Action Report contact Lyla Englehorn at [laengle@nps.edu](mailto:laengle@nps.edu).



**CAPT Carol O'Neal, USN (ret)**  
**CRUSER Director Innovation & Concept Generation**

### "Snipe"

by Shane Netherton, Chief of Operations, Strategic Defense Solutions, LLC



The "Snipe" is an integration of alternative energy technologies and advanced weapons systems. The highly advanced "Snipe" is a weapons capable solar electric UAV platform. The Snipe will leverage a rugged, fuselage, mission adaptable wing configurations, a proprietary sensor payload, and an advanced weapon system to yield mission persistence over an area of interest up to 3 times that of competitive systems.

The Snipe System is unique in the UAV market and delivers a highly flexible set of capabilities in a stealth package. The capabilities range from precision strike to advanced surveillance. Snipe also has the capability for a large number of UAVs to act as a "swarm" under the command of a single controller. The weapon system on the Snipe is a proprietary design which can be used for a variety of lethal missions. The current version of the weapon uses the 5.7x28 round, which is deployed in more than 40 countries.

Snipe is a self-contained, field deployable unit. In its smallest configuration, it can be backpack carried by a team and hand launched. In its larger configurations, it can be launched from mobile launchers and the entire system can be deployed via vehicle (including the command and control infrastructure).

The Snipe System is a game-changing capability in the UAV market. It surpasses current capabilities in terms of endurance, stealth, flexibility, and precision strike capability, integrating cutting-edge technology that helps governments and private enterprises deal with some of their most pressing security challenges. The system provides enhanced capability at a lower cost of ownership than many of the UAV systems currently on the market and can effectively integrate with your government's current assets to rapidly enhance their effectiveness.

Additional information available upon request.

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### Conference: InfoTech@Aerospace 2012

Conference Theme: Intelligent Autonomy for Space and Unmanned Systems

Abstract Deadline: 22 NOVEMBER 2011

Event Date: 19-21 JUNE 2012

Event Location: Hyatt Regency Orange County, Garden Grove, CA

AIAA Infotech is currently accepting currently accepting abstracts for papers relating to robotics, autonomous systems, and related topics. Additional details and the full call for papers can be found here: <http://www.aiaa.org/content.cfm?pageid=230&lumeetingid=2607>

### CRUSER News Contributions

Please contact Lisa Trawick at [cruser@nps.edu](mailto:cruser@nps.edu) if you are interested in writing a short article for a future newsletter





## STUDENT RESEARCH: IN-PROGRESS

**LCDR PAULA FIRENZE, USN**

NPS STUDENT IN THE FINANCIAL MANAGEMENT CURRICULUM

### THESIS TITLE: ESTIMATING COST SAVINGS OF TRANSITIONING TO OPEN ARCHITECTURE IN UNMANNED SYSTEMS AND POTENTIAL BARRIERS TO ACHIEVING SAVINGS

An examination of developing and updating costs for legacy systems compared to the similar costs for open architecture systems in the Unmanned Vehicle arena. The cost differential between legacy and OA in UAS will then be compared to that found in private industry to identify differences. Final, the thesis will analyze obstacles preventing the DoN from achieving the same cost savings found in the private sector and suggests ways to overcome these barriers.

If you information that may be useful in collecting data for this thesis please contact Paula Firenze at [pafirenz@nps.edu](mailto:pafirenz@nps.edu)

## CRUSER Technology Continuum

**7-10 May 2012**

Monterey, CA

in conjunction with the

The TENTH International Mine Warfare Technology Symposium

### This constitutes a call for technical papers and presentations.

Of particular interest are papers on relevant research, future capabilities, and novel ideas in technology applications of unmanned systems in the areas of Counter UAV, ISR, Information Assurance, Knowledge Management/Data Management, or Non-Kinetic Strike.

Extended abstracts, 850-1000 words, are due on or before January 31, 2012 to [CRUSER\\_TC@nps.edu](mailto:CRUSER_TC@nps.edu). Final papers must be submitted during the meeting to be included in the CD Proceedings. Submission form and additional details available at: <http://CRUSER.nps.edu>

### Thesis Topics from DoD Organizations

**Does your DoD Organization have potential graduate thesis topics related to unmanned systems they would like NPS students to research?** <https://wiki.nps.edu/display/CRUSER/Potential+Thesis+Topics>

### CRUSER News Blog

Subscribe to the RSS Feed to keep up to date with CRUSER related news articles on the CRUSER Blog at <https://wiki.nps.edu/display/CRUSER/Welcome+to+CRUSER>

## CALENDAR OF EVENTS

The CRUSER Calendar of Events is located on our Wiki:

<https://wiki.nps.edu/display/CRUSER/>

### Submit your events:

[http://www.nps.edu/Research/cruser/cruser\\_EventSub\\_Form.html](http://www.nps.edu/Research/cruser/cruser_EventSub_Form.html)

### CRUSER

#### COORDINATION GROUP

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